

**CIRCUITS AND METHODS FOR CHARACTERIZING
RANDOM VARIATIONS IN DEVICE CHARACTERISTICS
IN SEMICONDUCTOR INTEGRATED CIRCUITS**

Abstract of the Disclosure

5 Circuits and methods for measuring and characterizing random variations in device characteristics of semiconductor integrated circuit devices, which enable circuit designers to accurately measure and characterize random variations in device characteristics (such as transistor threshold voltage
10) between neighboring devices resulting from random sources such as dopant fluctuations and line edge roughness, for purposes of integrated circuit design and analysis. In one aspect, a method for characterizing random variations in device mismatch (e.g., threshold voltage mismatch) between a
15 pair of device (e.g., transistors) is performed by obtaining subthreshold DC voltage characteristic data for the device pair, and then determining a distribution in voltage threshold mismatch for the device pair directly from the corresponding subthreshold DC voltage characteristic data.
20 The voltage threshold mismatch distributions of different device pairs of a given circuit design can then be used to determine voltage threshold variations of the constituent circuit devices. The voltage threshold variation of the devices can be used to characterize the random variations of
25 the given circuit.